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10/518,228

12/16/2004

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EXAMINER

CHUO, TONY SHENG HSIANG

ART UNIT

PAPER NUMBER

1795

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,228	<b>Applicant(s)</b> RYOICHI ET AL.	
	<b>Examiner</b> Tony Chuo	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 8-21 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-21 is/are rejected.
- 7) ☒ Claim(s) 8, 14, 18 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/24/05</u> . | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on 10/24/05 was filed on 10/24/05. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

3. The drawings filed on 12/16/04 are accepted by the examiner.

### ***Specification***

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the term "positive level" in the claims is not supported by the specification. During a potential reversal, the fuel cell potential is a negative value.

***Claim Objections***

6. Claims 8, 14, 18 are objected to because of the following informalities: the word "occurring" should be deleted from the claims. Appropriate correction is required.

7. Claims 14 and 18 are objected to because of the following informalities: the word "dimethylethel-water" should be changed to "dimethylether-water". Appropriate correction is required.

8. Claim 20 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 20 fails to further limit the subject matter of claim 11. For purpose of compact prosecution, claim 20 is construed as being dependent on claim 18.

***Claim Rejections - 35 USC § 112***

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claim 21 recites the limitation "said cell stack" in line 3. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 14, 16-18, 20, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Meltser et al (EP 0982788).

Regarding claims 14 and 18, the Meltser reference discloses a method and apparatus for monitoring the performance of a fuel cell stack comprising: a diagnostic system “12” for detecting a polarity reversal between the anode potential and cathode potential when the cell voltage falls below the activation voltage of the photoemitter; and a fuel cell stack controller for alerting the stack’s operator (raising an alarm) upon detecting the polarity reversal (See column 3, lines 40-43, column 4 line 52 to column 5 line 4).

Examiner’s note: The recitation “of a liquid fuel feed fuel cell having at least a unit cell comprising: an anode having a Pt-Ru catalyst and a cathode having a Pt catalyst, opposed with each other; and a proton conductive polymer electrolyte interposed between said anode and said cathode, said anode being supplied a liquid fuel of at least a member of a group consisting of methanol aqueous solution, isopropanol aqueous solution, and dimethylethel-water mixture, and the cathode being supplied an oxidant gas” in claims 14 and 18 has not been given patentable weight

because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

In addition, the limitation “for preventing a Ru elution from said anode to said liquid-fuel” also is not given patentable weight because it is construed as being intended use.

In addition, claim 18 appears to be invoking 35 USC 112, 6<sup>th</sup> paragraph. The diagnostic system is an equivalent structure for detecting a positive level of a potential of the anode in comparison with a potential of the cathode. The fuel cell stack controller is an equivalent structure for performing the function of raising an alarm.

In addition, the activation voltage of the photoemitter taught by Meltser et al is construed as being a positive level of a potential of the anode in comparison with a potential of the cathode during a potential reversal.

Regarding claims 16, 17, 20, and 21, it also discloses coupling each of the individual cells in the stack to an optoisolator that detects the potential differences in the individual cells in the stack (See column 3, lines 27-28).

14. Claims 14, 16-18, 20, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Barton (US 6724194).

Regarding claims 14 and 18, the Barton reference discloses a method and apparatus for monitoring the cell voltage of a fuel cell stack comprising: a cell voltage monitor “2” for providing voltage detection values during a polarity reversal between the anode potential and cathode potential and upon detecting a potential reversal, providing a warning (alarm) (See column 5, lines 8-13, column 6 lines 21-26).

Examiner’s note: The recitation “of a liquid fuel feed fuel cell having at least a unit cell comprising: an anode having a Pt-Ru catalyst and a cathode having a Pt catalyst, opposed with each other; and a proton conductive polymer electrolyte interposed between said anode and said cathode, said anode being supplied a liquid fuel of at least a member of a group consisting of methanol aqueous solution, isopropanol aqueous solution, and dimethylethel-water mixture, and the cathode being supplied an oxidant gas” in claims 14 and 18 has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

In addition, the limitation “for preventing a Ru elution from said anode to said liquid-fuel” also is not given patentable weight because it is construed as being intended use.

In addition, claim 18 appears to be invoking 35 USC 112, 6<sup>th</sup> paragraph. The cell voltage monitor is an equivalent structure for detecting a positive level of a potential of the anode in comparison with a potential of the cathode and for performing the function of raising an alarm.

Regarding claims 16 and 20, it also discloses the voltage of each pair of fuel cells in stack "1" is monitored by a corresponding voltage monitoring unit (See column 5, lines 18-20).

Regarding claims 17 and 21, it also discloses a fuel cell stack in which each cell is equipped with a thermistor-based voltage monitoring unit (See column 7, lines 26-28).

### ***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 8, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivasan et al (WO 02/07242) in view of Meltser et al (EP 0982788).

The Srinivasan reference discloses a methanol-air fuel cell consisting of a stack of sub-fuel cells connected in series, wherein each sub-fuel cell comprises an anode having a Pt-Ru catalyst, a cathode having a Pt catalyst, and a proton conducting polymer membrane interposed between the anode and cathode, and wherein the anode

is supplied with a liquid fuel of aqueous methanol solution and the cathode is supplied with an oxidant gas (See paragraphs [0041],[0043],[0063]).

However, Srinivasan et al does not expressly teach a detecting means for detecting a positive level of a potential of said anode in comparison with a potential of the cathode so as to detect a potential reversal between the anode potential and the cathode potential occurring; a means for performing at least one of functions of increasing a supply of the liquid-fuel or the oxidant gas, raising an alarm, decreasing an output current of said fuel cell, and stopping an operation of said fuel cell, upon detecting said positive level, for preventing a Ru elution from said anode to said liquid-fuel; a detecting means monitoring a potential difference between said anode and said cathode in at least one of said unit cells in said cell stack; and a detecting means monitoring the potential difference of each unit cell in the cell stack.

The Meltser reference discloses a method and apparatus for monitoring the performance of a fuel cell stack comprising: a diagnostic system "12" for detecting a polarity reversal between the anode potential and cathode potential when the cell voltage falls below the activation voltage of the photoemitter; and a fuel cell stack controller for alerting the stack's operator (raising an alarm) upon detecting the polarity reversal (See column 3, lines 40-43, column 4 line 52 to column 5 line 4). It also discloses coupling each of the individual cells in the stack to an optoisolator that detects the potential differences in the individual cells in the stack (See column 3, lines 27-28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Srinivasan fuel cell stack to include a

detecting means for detecting a positive level of a potential of said anode in comparison with a potential of the cathode so as to detect a potential reversal between the anode potential and the cathode potential occurring; a means for performing at least one of functions of increasing a supply of the liquid-fuel or the oxidant gas, raising an alarm, decreasing an output current of said fuel cell, and stopping an operation of said fuel cell, upon detecting said positive level, for preventing a Ru elution from said anode to said liquid-fuel; a detecting means monitoring a potential difference between said anode and said cathode in at least one of said unit cells in said cell stack; and a detecting means monitoring the potential difference of each unit cell in the cell stack in order to safeguard failing cells against damage by detecting when undesirable operating conditions exist that portend major future stack difficulties that could result in polarity reversal of the cell (See Abstract).

17. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivasan et al (WO 02/07242) in view of Meltser et al (EP 0982788) as applied to claim 8 above, and further in view of Haridoss (US 2003/0003333).

However, Srinivasan et al as modified by Meltser et al does not expressly teach a detecting means detecting the positive level being not less than 200 mV. The Haridoss reference teaches that when a fuel cell is starved for fuel, the cell will show a negative voltage output. It further teaches that if the cathode absolute potential stays at approximately 0.6 V and the anode absolute potential approaches 1.0 V, the cell will show a potential of -0.4 V or -400 mV (See paragraph [0065]). This potential of -400 mV is equivalent to a positive level of 400 mV of a potential of the anode in comparison

with a potential of the cathode during a potential reversal between the anode potential and the cathode potential.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Srinivasan/Meltser fuel cell system to include a detecting means detecting the positive level being not less than 200 mV in order to prevent permanent irreversible damage from occurring to the fuel cell when the cell potential reaches -400 mV.

18. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivasan et al (WO 02/07242) in view of Meltser et al (EP 0982788) as applied to claim 8 above, and further in view of Mitsuta et al (JP 64-076682).

However, Srinivasan et al as modified by Meltser et al does not expressly teach at least two cell stacks provided with a plurality of cell groups, each having at least one of the unit cell connected in series, wherein the cell groups are connected in parallel with each other between the cell stacks; and a detecting means monitoring a potential difference between the anodes and cathodes in the cell groups being connected in parallel to detect a positive level in any of the unit cells in the cell groups being connected in parallel. The Mitsuta reference discloses a fuel cell stack A1 and a fuel cell stack B2 that each comprises a group of unit cells, wherein the unit cells in each stack are connected in series and the two fuel cell stacks are connected in parallel (See Abstract). Examiner's note: The diagnostic system taught by Meltser et al is capable of monitoring a potential different between anodes and cathodes in the cell groups being

connected in parallel to detect the positive level in any of the unit cell in the cell groups being connected in parallel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Srinivasan/Meltser fuel cell system to include at least two cell stacks provided with a plurality of cell groups, each having at least one of the unit cell connected in series, wherein the cell groups are connected in parallel with each other between the cell stacks; and a detecting means monitoring a potential difference between the anodes and cathodes in the cell groups being connected in parallel to detect a positive level in any of the unit cells in the cell groups being connected in parallel in order to prevent a trouble from affecting other assembled cells when the trouble occurs on part of the assembled cells by utilizing two fuel cell stacks (See Abstract).

19. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivasan et al (WO 02/07242) in view of Meltser et al (EP 0982788) and Mitsuta et al (JP 64-076682) as applied to claim 12 above, and further in view of Haridoss (US 2003/0003333).

However, Srinivasan et al as modified by Meltser et al and Mitsuta et al does not expressly teach a detecting means detecting the positive level being not less than 200 mV. The Haridoss reference teaches that when a fuel cell is starved for fuel, the cell will show a negative voltage output. It further teaches that if the cathode absolute potential stays at approximately 0.6 V and the anode absolute potential approaches 1.0 V, the cell will show a potential of -0.4 V or -400 mV (See paragraph [0065]). This potential of

-400 mV is equivalent to a positive level of 400 mV of a potential of the anode in comparison with a potential of the cathode during a potential reversal between the anode potential and the cathode potential.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Srinivasan/Meltser/Mitsuta fuel cell system to include a detecting means detecting the positive level being not less than 200 mV in order to prevent permanent irreversible damage from occurring to the fuel cell when the cell potential reaches -400 mV.

20. Claims 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meltser et al (EP 0982788) in view of Haridoss (US 2003/0003333). The Meltser reference is applied to claims 14 and 18 for reasons stated above.

However, Meltser et al does not expressly teach a detecting means detecting the positive level being not less than 200 mV. The Haridoss reference teaches that when a fuel cell is starved for fuel, the cell will show a negative voltage output. It further teaches that if the cathode absolute potential stays at approximately 0.6 V and the anode absolute potential approaches 1.0 V, the cell will show a potential of -0.4 V or -400 mV (See paragraph [0065]). This potential of -400 mV is equivalent to a positive level of 400 mV of a potential of the anode in comparison with a potential of the cathode during a potential reversal between the anode potential and the cathode potential.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Meltser fuel cell system to include a detecting means detecting the positive level being not less than 200 mV in order to

prevent permanent irreversible damage from occurring to the fuel cell when the cell potential reaches -400 mV.

21. Claims 8, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srinivasan et al (WO 02/07242) in view of Barton (6724194).

The Srinivasan reference discloses a methanol-air fuel cell consisting of a stack of sub-fuel cells connected in series, wherein each sub-fuel cell comprises an anode having a Pt-Ru catalyst, a cathode having a Pt catalyst, and a proton conducting polymer membrane interposed between the anode and cathode, and wherein the anode is supplied with a liquid fuel of aqueous methanol solution and the cathode is supplied with an oxidant gas (See paragraphs [0041],[0043],[0063]).

However, Srinivasan et al does not expressly teach a detecting means for detecting a positive level of a potential of said anode in comparison with a potential of the cathode so as to detect a potential reversal between the anode potential and the cathode potential occurring; a means for performing at least one of functions of increasing a supply of the liquid-fuel or the oxidant gas, raising an alarm, decreasing an output current of said fuel cell, and stopping an operation of said fuel cell, upon detecting said positive level, for preventing a Ru elution from said anode to said liquid-fuel; a detecting means monitoring a potential difference between said anode and said cathode in at least one of said unit cells in said cell stack; and a detecting means monitoring the potential difference of each unit cell in the cell stack.

The Barton reference discloses a fuel cell stack "1" comprising eight fuel cells in series C<sub>1</sub> to C<sub>8</sub> and a cell monitor "2" that employs four voltage monitoring units with one

unit used for each pair of cells in stack "1" (See column 5, lines 8-13). It also discloses that the presence of a higher than normal voltage warns of at least one low voltage pair of cells and the appropriate corrective action can be taken to prevent any damage from occurring due to voltage reversal in stack "1" (See column 5, lines 57-61). It also discloses an appropriate combination of components that provides voltage detection values and response time that provides adequate warning of voltage reversal in abnormal operating situations (See column 6, lines 21-26). It also discloses a fuel cell stack in which each cell is equipped with a thermistor-based voltage monitoring unit (See column 7, lines 26-28).

Examiner note: The cell voltage monitor taught by Barton is an equivalent structure for detecting a positive level of a potential of the anode in comparison with a potential of the cathode during a potential reversal and for performing the function of raising an alarm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Srinivasan fuel cell stack to include a detecting means for detecting a positive level of a potential of said anode in comparison with a potential of the cathode so as to detect a potential reversal between the anode potential and the cathode potential occurring; a means for performing at least one of functions of increasing a supply of the liquid-fuel or the oxidant gas, raising an alarm, decreasing an output current of said fuel cell, and stopping an operation of said fuel cell, upon detecting said positive level, for preventing a Ru elution from said anode to said liquid-fuel; a detecting means monitoring a potential difference between said anode and

said cathode in at least one of said unit cells in said cell stack; and a detecting means monitoring the potential difference of each unit cell in the cell stack in order to prevent any damage from occurring due to voltage reversal in the fuel cell stack.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 7:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795